

## SKIING SIMULATION

At left, Dr. Michael Holden is preparing a skier for a test in which a wind tunnel simulates the 60-mile-per-hour speeds encountered by a ski jumper. Dr. Holden is an aerodynamicist who normally works on the re-entry characteristics of space vehicles for Calspan Corporation, Buffalo, New York. The low speed wind tunnel, at Arvin/Calspan Advanced Technology Center, is generally used for aerospace research or in a company spinoff program involving the aerodynamic considerations of designing large structures (see page 92). Calspan donated the use of the wind tunnel for a program aimed at improving the performance of members of the U.S. Ski Team; Dr. Holden, a certified ski instructor, offered to apply his aerodynamics expertise to the design and supervision of the tests. Initiated four years ago, wind tunnel simulations have become an annual part of the U.S. Ski Team's training for U.S. and international events.

Dr. Holden realized the advantage of determining, on an individual basis, the optimal aerodynamic body positions at varying speeds in either ski jumping or downhill racing. He designed test equipment, including a computer program to simulate the conditions of actual ski courses, instruments to measure and display lift and drag values, and video screens to show a skier how changes in body position affect lift and drag; in the lower photo, Ski Team members watch on a monitor while a fellow member does a simulated jump.

Downhill racers learn from these simulations which body positions are most effective in maintaining speed through the flats, bumps, sharp turns and long radius turns that make up a downhill course. For ski jump simulations, the skier is supported by cables and counter-balanced so that, when the wind is turned on, he is literally flying and can "lean on the wind" as in an actual jump. In tunnel runs, skiers can learn in a few hours a personalized "tuck"—body position—that many of them have spent years trying to develop on a trial and error basis. U.S. Ski Team members and coaches are enthusiastic about the results.

